PATENT ABSTRACTS OF JAPAN

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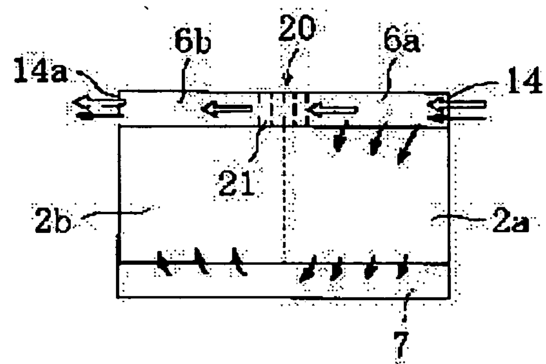
(54) HEAT EXCHANGER

(57)Abstract:
PROBLEM TO BE SOLVED: To reduce the stagnation or generation of gas phase refrigerant in the refrigerant passage of a heat exchanging unit by a method wherein heat exchanging effect can be sufficiently developed even when the liquid phase refrigerant and the gas refrigerant of 2-phase refrigerant are introduced into a heat exchanging unit and, especially, the flowing condition of the gas phase refrigerant and the liquid phase refrigerant in the heat exchanging unit is considered to reduce the flow of the gas phase refrigerant in the heat exchanging unit as much as possible.



SOLUTION: The liquid phase refrigerant of the 2-phase refrigerant, which is introduced into the upper tank 6 of the heat exchanging unit 2, descends in a tube mainly and is guided to a lower tank 7 while the gas phase refrigerant passes mainly through a flow control unit in the upper tank 6 into lengthwise direction of the same and is further separated into the gas phase refrigerant and the liquid phase refrigerant in the flow control unit, then, the liquid phase refrigerant descends into the tube.

LEGAL STATUS

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CLAIMS

[Claim(s)]
[Claim 1] The tank section of a vertical pair, and the tube connected between these tank sections, In the heat exchanger constituted [sections / of a multi-unit preparation and each heat exchange unit / tank] by being open for free passage in the heat exchange unit constituted by arranging a fin between these tubes The 1st free passage way which opens the upper-tank section of the 1st heat exchange unit and the upper-tank section of the 2nd heat exchange unit for free passage is prepared. The 2nd free passage way which opens the lower-tank section of the 1st heat exchange unit and the lower-tank section of the 2nd heat exchange unit for free passage is prepared, and it sets in the upper-tank section of the 1st heat exchange unit. The inlet-port section which supplies a refrigerant to the 1st free passage way and the side which counters is prepared, and it sets in the upper-tank section of the 2nd heat exchange unit. The heat exchanger characterized by having prepared the outlet section which discharges a refrigerant in the 1st free passage way and the side which counters, and preparing the conduction control section controlled according to the amount of conduction in the above-mentioned 1st free passage way.
[Claim 2] In a heat exchanger according to claim 1, this conduction control section of the above-mentioned 1st free passage way is characterized by preparing two or more openings from which the configuration or location of the cross section differs in the free passage direction, and being formed in it.
[Claim 3] In a heat exchanger according to claim 1 or 2, this conduction control section of the above-mentioned 1st free passage way is characterized by preparing two or more openings from which the magnitude of the cross section differs in the free passage direction, and being formed in it.
[Claim 4] In a heat exchanger according to claim 2 or 3, the cross-sectional area of the above-mentioned opening is characterized by being smaller than the cross-sectional area of a upper tank above the cross-sectional area of a tube, and an EQC.
[Claim 5] In claim 1 thru/or the heat exchanger of any one publication of four the 1st heat exchange unit and the 2nd heat exchange unit The refrigerant plate with which it is formed on the refrigerant plate which each upper tank, the lower tank, and the tube really fabricated by the same member and with which the opening area or the opening location of opening of the above-mentioned conduction control section is different by carrying out two or more laminatings Opening of the above-mentioned conduction control section is characterized by being formed in the direction of a laminating as random opening.
[Claim 6] In claim 1 thru/or the heat exchanger of any one publication of four, at least two sets of sets of the 1st heat exchange unit and the 2nd heat exchange unit are prepared in a windward and leeward side. The refrigerant plate with which it is formed on the refrigerant plate which the upper tank, lower tank, and tube of both sets really fabricated by the same member and with which the opening area or the opening location of opening of the above-mentioned conduction control section is different by carrying out two or more laminatings Opening of the above-mentioned conduction control section is characterized by being formed in the direction of a laminating as random opening.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the heat exchanger constituted by connecting at least two units of heat exchange units which have the refrigerant path which performs refrigerant evaporation.
[0002]
[Description of the Prior Art] Conventionally, a heat exchanger which is looked at by JP,09-170850,A is known. This heat exchanger arranges the tank section to vertical both ends, as shown in drawing 11 , and laminating arrangement of the heat exchange unit is carried out at leeward side and a windward.
[0003] In this heat exchanger, the batch section 111 is formed in the central part of the lower-tank section of the leeward side heat exchanger 102, and it is classified into 1st lower-tank 107a and 2nd lower-tank 107b. The batch section 110 is similarly formed in the central part of the upper-tank section of a windward heat exchanger, and it is classified into 1st upper-tank 108a and 2nd top tank 108b. 2nd lower-tank 107b and 2nd upper-tank 108b are opened for free passage on the free passage way 112. The inlet-port section 114 of a refrigerant is formed in 1st lower-tank 107a, and the outlet section 115 is formed in 1st upper-tank section 108a.
[0004] In this heat exchanger, a refrigerant goes into 1st lower-tank 107a from the inlet-port section 114, goes up the refrigerant path in a tube, and is led to a upper tank 106. And conduction of the inside of this upper tank 106 is carried out to a longitudinal direction, a refrigerant path is descended, and it results in 2nd lower-tank 107b. Furthermore, a refrigerant is led to 2nd upper-tank 108b through the free passage way 112, descends a refrigerant path from there, is led to a lower tank 109, it carries out conduction of the inside of this lower tank 109 to a longitudinal direction, goes up a refrigerant path, results in 1st upper-tank 108a, and flows out of the outlet section 115 of this 1st upper-tank 108a.
[0005]
[Problem(s) to be Solved by the Invention] In the thing of JP,09-170850,A, the liquid phase refrigerant of a vapor-liquid 2 phase refrigerant and a gaseous-phase refrigerant go into 1st lower-tank 107a from the inlet-port section 114, go up the leeward side refrigerant path in a tube, and are led to a upper tank 106. Then, as shown in drawing 12 , a light gaseous-phase refrigerant becomes the inclination to collect on the central upper part part of the refrigerant path the inlet-port section of the 1st heat exchange unit, and near the side which counter. And although a refrigerant carries out conduction of the inside of the upper tank 106 to a longitudinal direction, descends a refrigerant path and usually results in 2nd lower-tank 107b, in case conduction of 106 in an upper tank is carried out to a longitudinal direction, a comparatively heavy liquid phase refrigerant becomes the inclination to collect on the central lower part part of the near refrigerant path where it is led to the longitudinal direction back according to conduction inertia, consequently a gaseous-phase refrigerant counters with the outlet section of the 2nd heat exchange unit. It occurs that the same is said of a windward heat exchange unit.
[0006] Thus, a gaseous-phase refrigerant focuses on a part of heat exchange unit, uniform flow is not made, equal heat distribution is not acquired, and heat exchange in a heat exchange unit is

not fully carried out to a stagnation ****** sake. Therefore, it is possible to increase the number of heat exchange units and to lengthen the path length of a refrigerant path. If it is made such, the total capacity of a heat exchange unit will become large, and the problem of a tooth space will occur. Moreover, although the so-called thing [forming many pass] which subdivide a heat exchange unit and increases the number of heat exchange units is also considered, the path length of a refrigerant path becomes long, circulation resistance increases and a pressure loss becomes large.
[0007] Especially, a liquid phase refrigerant and a gaseous-phase refrigerant are intermingled, conduction of the inside of a heat exchange unit is carried out caudad, by the type which makes a U-turn and goes up from there, distribution with a liquid phase refrigerant and a gaseous-phase refrigerant is expanded in the refrigerant path going up, the difference of temperature distribution increases, and heat exchange capacity declines. With it, since evaporation effectiveness is bad and, as for the partial liquid phase refrigerant, is discharged from the outlet section of a thermal effect unit as it is, a refrigerant circulating load decreases and cooling capacity declines.
[0008] Moreover, in JP,10-325645,A, as shown in drawing 13 , it had the leeward side heat exchange unit 202 and the windward heat exchange unit 203, and the leeward side heat exchange unit 202 was equipped with the tank sections 206 and 207 of a vertical pair, and the windward heat exchange unit 203 is equipped with the tank sections 208 and 209 of a vertical pair. The lower tank 207 of the leeward side heat exchange unit 202 was equipped with the bridge wall 211, and the upper-tank section 206 of the windward heat exchange unit 203 is equipped with the bridge wall 210.
[0009] A refrigerant is usually introduced from the inlet-port section 214, carries out conduction of the flank tank, goes into lower-tank 207a of the downstream heat exchange unit 202, goes up the inside of the tube which is a refrigerant path, results in a upper tank, it flows horizontally from there, descends the inside of a tube, and results in lower-tank 207b. It passes along the free passage way 212, and goes into upper-tank 208b of a windward heat exchange unit, the inside of a tube is descended, and it results [from there] in a lower tank 209. The inside of the tank is flowed horizontally, the inside of a tube is gone up, and it results in upper-tank 208a, and is discharged from the outlet section 215.
[0010] In this official report, the start time of the liquid cooling intermediation return to the compressor immediately after cycle starting on the low-fever load conditions of winter was shortened, with an eye on mitigating the lack of lubrication of a compressor, through tube 210a was prepared in the bridge wall 210, through tube 211a was prepared in the through tube 211, through tubes 209a and 209a are formed in both the sides of a lower tank 209, and through tubes 206a and 206a are formed in both the sides of a upper tank 206. Therefore, since the flow through these through tubes is formed apart from the usual flow and a short circuit path can do a refrigerant by the through tube, as for a refrigerant, a heat exchange unit can be passed in a short time.
[0011] However, each cross section of a through tube is small, and in order that a refrigerant may pass this through tube at high speed, the loud sound which poses a noise top problem occurs. Moreover, since a refrigerant flows quickly and sufficient heat exchange is not performed, there are few circulating loads of a refrigerant and heat exchange runs short. Moreover, since various flow is formed, it becomes a remarkable turbulent flow, and is easy to generate a gaseous phase, and separation of a gaseous phase and the liquid phase is also difficult for a refrigerant. Moreover, a through tube brings a result which has prepared in fixed portions, such as a bridge wall, and is prepared in the fixed location, control according to the amount of refrigerants which carries out conduction cannot be performed, and sufficient vapor liquid separation is not made.
[0012] This invention offers the heat exchanger which can fully demonstrate the heat exchange effectiveness, even if the liquid phase refrigerant of 2 phase refrigerant and a gaseous-phase refrigerant are introduced especially into a heat exchange unit with an eye on canceling the trouble of the above-mentioned conventional technique. Especially, in consideration of the conduction situation of the gaseous-phase refrigerant within a heat exchange unit, and a liquid

phase refrigerant, conduction of the gaseous-phase refrigerant within a heat exchange unit is lessened as much as possible, and a gaseous-phase refrigerant lessens stagnation or generating in the refrigerant path of a heat exchange unit.

[0013]

[Means for Solving the Problem] invention of claim 1 — the tank section of a vertical pair Tube connected between these tank sections In the heat exchanger constituted [sections / of a multi-unit preparation and each heat exchange unit / tank] by being open for free passage in the heat exchange unit constituted by arranging a fin between these tubes The 1st free passage way which opens the upper-tank section of the 1st heat exchange unit and the upper-tank section of the 2nd heat exchange unit for free passage is prepared. The 2nd free passage way which opens the lower-tank section of the 1st heat exchange unit and the lower-tank section of the 2nd heat exchange unit for free passage is prepared, and it sets in the upper-tank section of the 1st heat exchange unit. It is the configuration that the inlet-port section which supplies a refrigerant to the 1st free passage way and the side which counters was prepared, the outlet section which discharges a refrigerant was prepared in the 1st free passage way and the side which counters in the upper-tank section of the 2nd heat exchange unit, and the conduction control section controlled according to the amount of conduction was prepared in the above-mentioned 1st free passage way.

[0014] In this configuration, since the amount of refrigerants which carries out conduction of this conduction control section, and is led to the upper tank of the 2nd heat exchange unit can be changed according to the amount of refrigerants introduced in the upper tank of the 1st heat exchange unit and the boundary of the 1st heat exchange unit and the 2nd heat exchange unit can be changed, effective heat exchange is obtained with an easy configuration.

[0015] As for the refrigerant with which invention of claim 2 carries out conduction of this conduction control section since this conduction control section of the above-mentioned 1st free passage way prepares two or more openings from which the configuration or location of the cross section differs in the free passage direction in the heat exchanger of claim 1 and is formed, zigzag or the configuration in which it will flow making a direction change and a liquid phase refrigerant cannot flow easily is obtained effectively. Moreover, since two or more above-mentioned openings are prepared, even if a part of refrigerant which carries out conduction of the first opening includes the liquid phase, it descends in the direction of a tube of the lower part of this part, the liquid phase serves as few refrigerants gradually, and this liquid phase refrigerant is led to the 2nd heat exchanger.

[0016] In a heat exchanger according to claim 1 or 2, since this conduction control section of the above-mentioned 1st free passage way prepares two or more openings from which the magnitude of the cross section differs in the free passage direction in invention of claim 3 and is formed, in this conduction control section, gradually, resistance cannot flow easily greatly, the refrigerant which carries out conduction is becoming, and the configuration in which a liquid phase refrigerant cannot flow easily is obtained effectively. Moreover, since two or more above-mentioned openings are prepared like claim 2, even if a part of refrigerant which carries out conduction of the first opening includes the liquid phase, it descends in the direction of a tube of the lower part of this part, the liquid phase serves as few refrigerants gradually, and this liquid phase refrigerant is led to the 2nd heat exchanger.

[0017] In a heat exchanger according to claim 2 or 3, since the cross-sectional area of the above-mentioned opening is the cross-sectional area of a tube, and more than an EQC and is smaller than the cross-sectional area of a upper tank, invention of claim 4 can control that a refrigerant carries out conduction of this opening quickly, and can reduce noise generating.

[0018] Invention of claim 5 is set to claim 1 thru/or any of 4 or the heat exchanger of a publication. The 1st heat exchange unit and the 2nd heat exchange unit The refrigerant plate with which it is formed on the refrigerant plate which each upper tank, the lower tank, and the tube really fabricated by the same member and with which the opening area or the opening location of opening of the above-mentioned conduction control section is different by carrying out two or more laminatings Since opening of the above-mentioned conduction control section is formed in the direction of a laminating as random opening, manufacture cost can be reduced and

assembly is also easy.
[0019] Invention of claim 6 is set to claim 1 thru/or any of 4 or the heat exchanger of a publication. At least two sets of sets of the 1st heat exchange unit and the 2nd heat exchange unit are prepared in a windward and leeward side. The refrigerant plate with which it is formed on the refrigerant plate which the upper tank, lower tank, and tube of both sets really fabricated by the same member and with which the opening area or the opening location of opening of the above-mentioned conduction control section is different by carrying out two or more laminatings While being able to manufacture with an easy configuration and being able to reduce manufacture cost even if it is the heat exchange unit of two trains of leeward side and a windward since opening of the above-mentioned conduction control section is formed in the direction of a laminating as random opening, assembly can also be performed easily.
[0020]
[Embodiment of the Invention] Below, the 1st example of this invention is explained based on a drawing. Drawing 1 thru/or drawing 3 show the heat exchanger 1 of the 1st example. As shown in drawing 1 , a heat exchanger 1 consists of a leeward side heat exchange unit 2 and a windward heat exchange unit 3, as shown by wind A. The laminating of a tube 4 and the wavelike fin 5 for heat dissipation is carried out by turns, and the leeward side heat exchange unit 2 and the windward heat exchange unit 3 consist of the tank sections 6 and 7 in which this tube 4 by which the laminating was carried out, and the wavelike fin 5 were formed up and down, and 8 and 9, respectively.
[0021] In this 1st example, as shown in drawing 2 , the upper tank 6 of the leeward side heat exchange unit 2 and the upper tank 8 of the windward heat exchange unit 3 do not have a bridge wall, and are opened for free passage. Similarly, the lower tank 7 of the leeward side heat exchange unit 2 and the lower tank 9 of the windward heat exchange unit 3 do not have a bridge wall, either, and are opened for free passage.
[0022] The inlet-port section 14 of a refrigerant is formed in the 1st tank section 6 of the upper part of the leeward side heat exchange unit 2, and the outlet section 15 of a refrigerant is formed in the 1st tank section 8 of the upper part of the windward heat exchanger 3.
[0023] The flow of the usual refrigerant is explained. The refrigerant which consists of a liquid phase refrigerant and a gaseous-phase refrigerant is usually introduced into the 1st tank 6 of the upper part of the leeward side heat exchange unit 2 from the inlet-port section 14. The liquid phase refrigerant in the 1st tank 6 of the upper part has heavy weight, the refrigerant path 4 which consists of a tube is descended, and it is led to a lower tank 7, and it flows the inside of a lower tank 7 to a longitudinal direction, goes up the inside of a tube 4, and is led to the 2nd tank 6 of the upper part.
[0024] At this time, when there are many amounts of refrigerants, there are many amounts which flow the inside of a tube caudad, and it exceeds the amount of tubes of the refrigerant going up. To it, when there are few amounts of refrigerants, as shown in drawing 3 R> 3, there are few amounts which flow the inside of a tube caudad, and it is less than the amount of tubes of the refrigerant going up. At this time, a field while a refrigerant is descending the inside of a tube constitutes 1st heat exchange unit 2a, and a field while a refrigerant is going up the inside of a tube constitutes 2nd heat exchange unit 2b. The boundary of this 1st heat exchange unit 2a and the 2nd heat exchange unit is changed according to the amount of refrigerants. In connection with this, the by-pass rate of a gaseous-phase refrigerant is also controlled, and a gaseous phase and the liquid phase are separated effectively.
[0025] Thus, the gaseous-phase refrigerant and liquid phase refrigerant which were separated are led to free passage opening 15a through the free passage way 16 from free passage opening 14a, and are led to the upper tank 8 of a windward from there. Separation of the gaseous phase and liquid phase as the leeward side heat exchange unit 2 also with this same windward heat exchange unit 3 is performed. Therefore, it dissociates efficiently and a gaseous phase and the liquid phase are discharged from a heat exchange unit. In addition, the conduction control section of this invention does not prepare a certain path limit section in a upper tank, and means the amount of downward tubes and the amount of rise tubes which are changed according to the amount of refrigerants introduced into a upper tank in this 1st example including that by which a

upper tank is opened for free passage.
[0026] Drawing 4 is concerned with the 2nd example. In the 1st example, the conduction control section 20 prepared in the longitudinal direction interstitial segment of a upper tank 6 forms two or more openings 21 (21a, 21b, 21c, 21d, 21e, 21f) from which the configuration or location of the cross section differs in the free passage direction, and this 2nd example is formed. The partial enlarged drawing of a conduction control section is shown in drawing 5 , and the configuration of the opening 21 there is shown in drawing 6 . As shown in drawing 5 and drawing 6 , opening of a lower semicircle and opening of an upper semicircle are repeatedly prepared by turns from the upstream. Especially the opening area of opening 21 is formed more than the opening area of a tube 4, and an EQC.
[0027] With such a configuration, since resistance in case the mixed refrigerant of the gaseous phase and liquid phase refrigerant introduced into the upper tank 6 passes this opening 21 is strong, a liquid phase refrigerant becomes the inclination which descends the inside of a tube 4 rather than it passes this opening 21. In addition, although a liquid phase refrigerant also enters also into this opening 21 partially, the refrigerant with which opening 21 is changing with the upper half and the lower half, and passes through this needs to repeat directional change. Therefore, the refrigerant which cannot be overcome to the following opening descends the inside of a tube 4 from this upper-tank section 6. The liquid phase refrigerant of this descending refrigerant is most. Thus, while overcoming and carrying out conduction of two or more openings, separation with a liquid phase refrigerant and a gaseous-phase refrigerant is promoted.
[0028] Since it has formed more than the opening area of a tube 4, and an EQC, even if the opening area of opening 21 prepares some openings, a refrigerant does not carry out conduction of it to a high speed, it does not have a problem on the noise, and can fully secure the circulating load of a refrigerant.
[0029] Although the refrigerant carried into opening changes with the mixed state and the amounts of refrigerants of the liquid phase and a gaseous phase in the 1st example, since the isolation in opening 21 is promoted according to that refrigerant condition in this example, a gaseous phase and the liquid phase are separated certainly.
[0030] In the 1st example, when a lot of vapor-liquid mixing refrigerants are introduced into a upper tank 6 by the high-pressure force, it becomes the inclination for a liquid phase refrigerant to also flow to a longitudinal direction within a upper tank 6, and a gaseous-phase refrigerant and a liquid phase refrigerant may not fully be separated. In such a case, like the 2nd example, if opening 21 is formed, it is convenient.
[0031] Although opening 21 was formed in the leeward side heat exchange unit 2 and the windward heat exchange unit 3 in the 2nd example, the above-mentioned opening 21 is formed only in the leeward side heat exchange unit 2, and the windward heat exchange unit 3 can also be constituted like the 1st example. If it does in this way, to an initial refrigerant with inadequate separation of a gaseous phase and the liquid phase, by the above-mentioned opening 21 prepared in the heat exchange unit, a gaseous phase and liquid phase separation are performed positively, in the second half, it is the heat exchange unit which has not prepared opening, and a gaseous phase and liquid phase separation can be performed by natural flow.
[0032] Moreover, in the early heat exchange unit 2 into which a refrigerant is introduced, and the heat exchange unit 3 in the second half of 2nd henceforth, the magnitude, number, location, etc. of this opening are changed, the resistance which passes through this is changed, opening of the heat exchange unit which an initial refrigerant passes enlarges resistance, and it may be made to lessen resistance after it gradually.
[0033] Drawing 7 is concerned with the 3rd example and changes the configuration of the openings 31a and 31b corresponding to the opening 21 of the 2nd example. That is, it is made to repeat as the circular openings 31a and 31a are formed in two upper and lower sides and then the circular openings 31b and 31b are formed in two right and left. A gaseous phase and a liquid phase refrigerant are efficiently separable in this 3rd example as well as the 2nd example.
[0034] Drawing 8 is concerned with the 4th example, and as Signs 41a-41d show, it makes magnitude of semicircle opening of drawing 6 small gradually. Thus, by changing Openings [41a 41b, 41c, and 41d] a location and magnitude, while passing a gaseous-phase refrigerant, the

isolation which drops a liquid phase refrigerant in a tube can be raised.
[0035] Drawing 9 is concerned with the 5th example and forms the openings 51a, 51b, 51c, and 51d of another configuration. It has the effectiveness as the 4th example also with the 5th same example.
[0036] Drawing 10 is concerned with the 6th example. In this 6th example, it forms on the refrigerant plate which really fabricated the upper tank 66-69, the lower tank 67-69, and the tube 64 by the same member. In this example, as shown in drawing 10 a, the openings 66a and 68a of a conduction control section are formed in the configuration where the opening area of opening was restricted, and 66 of a upper tank and the usual part of 68 use them as opening as shown in drawing 10 B. The heat exchange unit which are this configuration, then an easy configuration, and was excellent in heat exchange effectiveness with low cost can be obtained.
[0037] In this invention, the magnitude of opening, a location, a configuration, and the quantity of the longitudinal direction of opening are not limited to the above-mentioned example, and can be changed according to a situation.
[0038]
[Effect of the Invention] The tube connected between the tank section of a vertical pair, and these tank section in invention of claim 1, In the heat exchanger constituted [sections / of a multi-unit preparation and each heat exchange unit / tank] by being open for free passage in the heat exchange unit constituted by arranging a fin between these tubes The 1st free passage way which opens the upper-tank section of the 1st heat exchange unit and the upper-tank section of the 2nd heat exchange unit for free passage is prepared. The 2nd free passage way which opens the lower-tank section of the 1st heat exchange unit and the lower-tank section of the 2nd heat exchange unit for free passage is prepared, and it sets in the upper-tank section of the 1st heat exchange unit. The inlet-port section which supplies a refrigerant to the 1st free passage way and the side which counters is prepared, and it sets in the upper-tank section of the 2nd heat exchange unit. It is the configuration that the outlet section which discharges a refrigerant was prepared in the 1st free passage way and the side which counters, and the conduction control section controlled according to the amount of conduction was prepared in the above-mentioned 1st free passage way, and a gaseous-phase refrigerant and a liquid phase refrigerant can be effectively separated with an easy configuration, and heat exchange effectiveness can be improved.
[0039] When a conduction control section prepares two or more openings from which the configuration or location of the cross section differs in the free passage direction and is formed in it Even if a part of zigzag or refrigerant which it will flow, and a liquid phase refrigerant cannot flow easily, and carries out conduction of the first opening includes the liquid phase, making a direction change, the refrigerant which carries out conduction of this conduction control section It descends in the downward direction of a tube from this part, the liquid phase serves as few refrigerants gradually, this liquid phase refrigerant is led to the 2nd heat exchange unit, and separation with a gaseous phase and the liquid phase is promoted also for this conduction control section. Therefore, it flows smoothly, without confusing the liquid phase refrigerant which does not contain a gaseous-phase refrigerant, and the variation in the heat exchange in a tube is reduced.
[0040] When the cross-sectional area of the above-mentioned opening is smaller than the cross-sectional area of a upper tank above the cross-sectional area of a tube, and an EQC, it can control that a refrigerant carries out conduction of this opening quickly, and noise generating can be reduced.

[Translation done.]

DESCRIPTION OF DRAWINGS

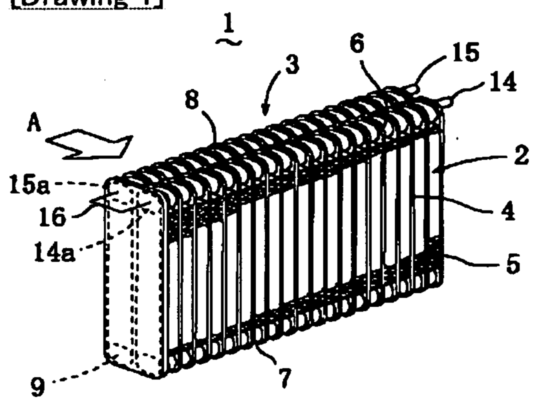
[Brief Description of the Drawings]
[Drawing 1] The outline perspective view of the heat exchanger of the 1st example which applied this invention is shown.
[Drawing 2] It is the explanatory view showing the flow of the refrigerant of the 1st example.
[Drawing 3] It is another explanatory view showing the flow of the refrigerant of the 1st example.

[Drawing 4] It is drawing showing the heat exchanger of the 2nd example.
[Drawing 5] The partial enlarged drawing of the 2nd example is shown.
[Drawing 6] The sectional view of opening of the 2nd example is shown.
[Drawing 7] It is concerned with the 3rd example and the same drawing as drawing 6 is shown.
[Drawing 8] It is concerned with the 4th example and the same drawing as drawing 6 is shown.
[Drawing 9] It is concerned with the 5th example and the same drawing as drawing 6 is shown.
[Drawing 10] It is drawing in which being concerned with the 6th example and showing a part of heat exchange unit.
[Drawing 11] It is drawing showing the conventional technique.
[Drawing 12] It is drawing as for which the liquid phase refrigerant of the conventional technique and a gaseous-phase refrigerant give distribution condition explanation.
[Drawing 13] It is drawing showing another conventional technique.
[Description of Notations]
1 Heat Exchanger
2 Leeward Side Heat Exchange Unit
3 Windward Heat Exchange Unit
4 Tube (Refrigerant Path)
5 Fin
6 Upper Tank
7 Lower Tank
8 Upper Tank
9 Lower Tank
14 Inlet-Port Section
15 Outlet Section
16 Free Passage Way
20 Conduction Control Section
21a, 21b, 21c, 21d, 21e, 21f Opening

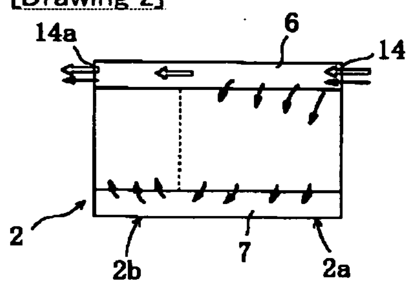
[Translation done.]

DRAWINGS

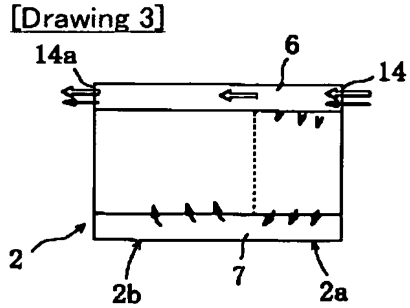
[Drawing 1]



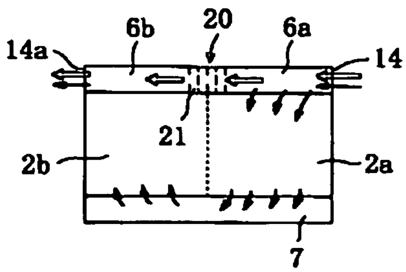
[Drawing 2]



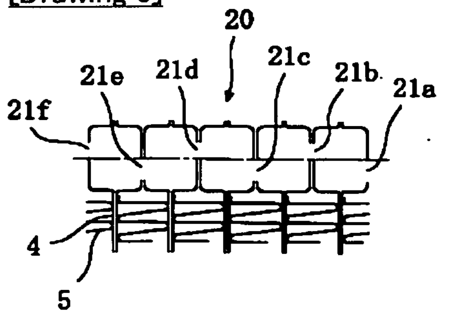
[Drawing 3]



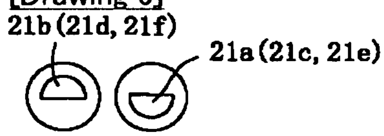
[Drawing 4]



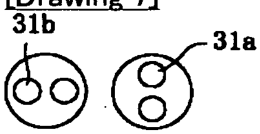
[Drawing 5]



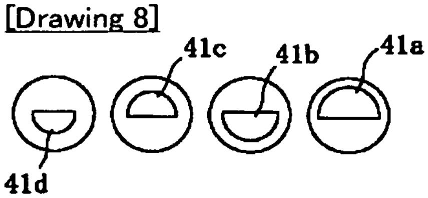
[Drawing 6]



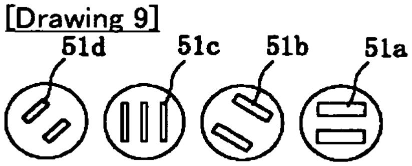
[Drawing 7]



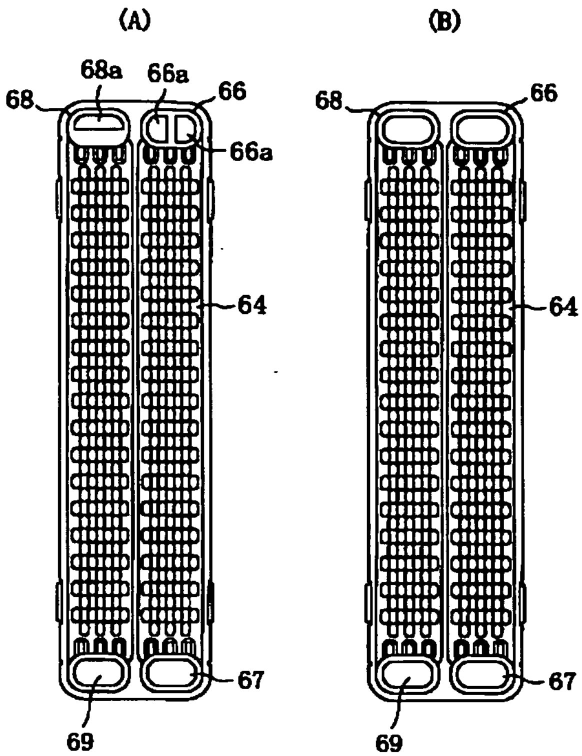
[Drawing 8]



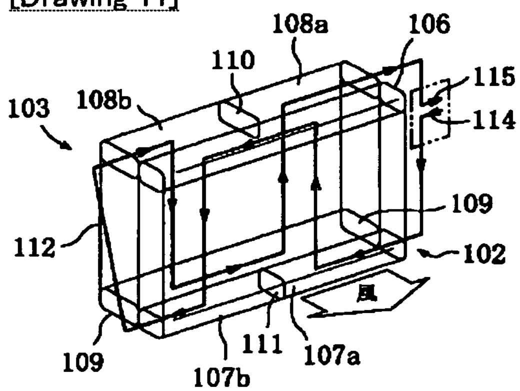
[Drawing 9]



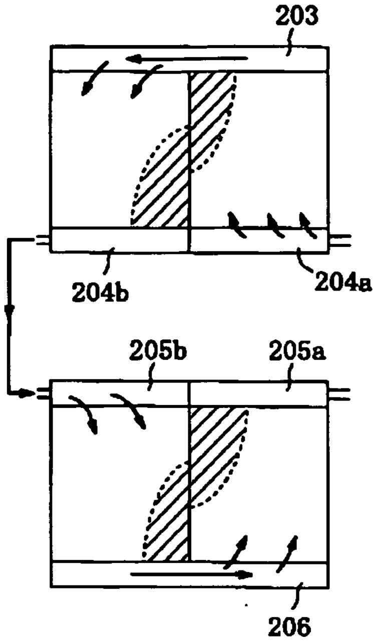
[Drawing 10]



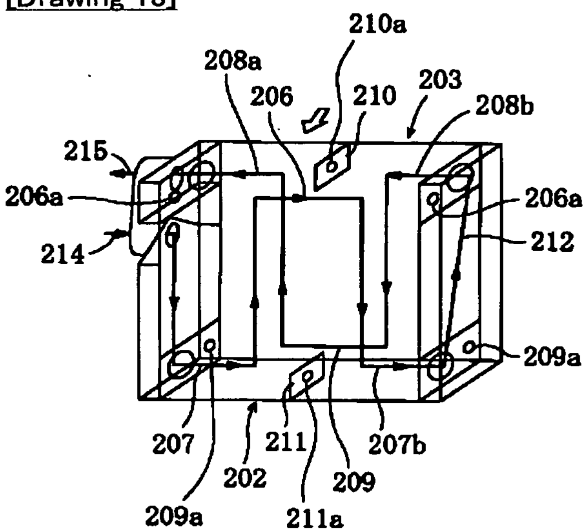
[Drawing 11]



[Drawing 12]



[Drawing 13]



[Translation done.]